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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,732	11/06/2001	David R. Shafer	5589-00807/ebm	9123

7590 10/31/2002

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EXAMINER

NGUYEN, THONG Q

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 10/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/005,732

Applicant(s)

SHAHER ET AL.

Examiner

Thong Q. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 August 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 21-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. The present application was subjected to a restriction requirement. See Paper No. 6 mailed to applicant on 7/24/2002. In response to the restriction requirement, applicant has canceled claims 41-45 which direct to the second invention. As a result, the remaining claims 21-40 directed to the first invention are now examine din this Office action.

### ***Drawings***

2. The drawings contain five sheets of figures 1-8 filed on 11/06/2001 have been received by the Office.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: *In particular, the numerical references "37' ", "39' " and "41' " as shown in figure 3; the numerical reference "88" as shown in figure 6; and the numerical reference "117" as shown in figure 7 are not mentioned in the specification.* A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

4. The lengthy specification which is amended by the Amendment has not been checked to the extent necessary to determine the presence of all possible minor errors.

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Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

5. The disclosure is objected to because of the following informalities: a) Page 4: line 6m, "Disclosure of the Invention" should be changed to --Summary of the Invention-- ; b) Page 16, line 26, "61-69" should be changed to --61, 63, 65, 67, 69--. Applicant should note that the so-called "illumination group" as described in the specification in page 16 and shown in figure 4 does not have any component labeled as 62 or 64 or 66 or 68. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 21-40 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for using a catadioptric system having a catadioptric group comprising reflecting elements and refractive elements, a field lens group and a focusing lens group for imaging an object illuminated by light of multiple wavelengths, does not reasonably provide enablement for using a board band ultraviolet objective lens comprises a first lens and a second lens of different dispersions for imaging a first object with a first wavelength and a second object with a second wavelength different from the first wavelength. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

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8. Claims 21-40 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The device as claimed in claims 21-40 is directed to an optical system having lens elements and reflective elements. There are two examples concerning the data showing the optical characteristics of the optical elements used to constitute the device being disclosed in the specification as can be seen in pages 13-14.

However, the data relating to the optical characteristics of the optical elements disclosed in the lens data contain some questionable problems as follows.

First, regard to the lens data described in page 13, it is not understood why applicant has disclosed that both surfaces (22 and 24) have positive values, i.e., 50.470. Applicant should note that the use of positive sign and negative sign for (lens/mirrored) surfaces of an optical element must be consistent. In other words, if the surface of an optical element having a convex configuration with respect to the direction of the incident light beam is assigned as a positive sign then the surface of an optical element having a concave configuration with respect to the direction of the incident light beam must be assigned as a negative sign. In this aspect, each value of the surface (22) and the surface (23) of the lens data in page 13 should have a negative sign and the value of the surface (24) has a positive sign.

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Second, the similar problem concerning the sign of the surfaces is also occurred to the lens data described in page 14. In other words, the Examiner is of opinion that each value of the surface (24) and the surface (25) in the lens data of page 14 should have a negative sign and the value of the surface (26) has a positive sign.

Third, the data concerning the distance between two adjacent optical elements as provided in page 15 is unclear. In particular, it is unclear why applicant has disclosed that the distance between surfaces 4 and 5 and the distance between surfaces 5 and 6 are equal to each other, i.e., both distances have the same value of 413.186. Applicant should note that the distance between surfaces 4 and 5 is the distance defined between the exit lens surface of the lens element (73) and the reflector (75) while the distance between the surfaces 5 and 6 is the distance defined by the reflector (75) and the reflector (77). See also figure 4. Since the distance between the two mirrors (75 and 77) is not shown as equal to the distance between the mirror (75) and the lens element (73); therefore, it is unclear why both distances have the same value. Further, since the shape of the reflector (77) has a convex configuration and the shape of the reflector (75) has a concave configuration (see specification page 15, lines 16-19), it is not understood why both mirror surfaces of the reflectors (75 and 77) have the same sign.

Repeat

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 21-31 and 32-40, as best as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson (U.S. Patent No. 5,031,977)

Gibson discloses an optical lens system for imaging light in the deep ultraviolet range in an exposure system for copying images/patterns of a reticle to a wafer.

The optical lens system comprises two lens elements cemented together wherein the materials of the two lenses are of different dispersions. In other words, one of the lenses is made by fused silica and the other lens is made by lithium fluoride.

The lens system as described by Gibson is used in a photolithography system wherein the illuminating light has design wavelengths of 249.8 nm and 243.8 nm (see column 3) for illuminating a reticle which as understood comprises patterns whose material is different from that of the reticle.

With regard to the feature concerning the "objective lens" as recited in claims 21 and 37, such feature is not given a patentable weight because all of the features recited in the claims are directed to a formation of two lens elements made by different dispersion and there is not any structural limitations in the inspection system being claimed to determine the set of two lens elements are an objective lens of the inspection system.

With regard to the wavelengths of different values as recited in the present claims 25 and 28, and the separation between the two wavelengths as recited in claim 26, such features are not critical to the invention by the mutually exclusive of the values of the wavelengths claimed. For instance, while the wavelengths of the claim 25 are selected from a group consisting of 193 nm, 248 nm and 365 nm then the wavelengths of claim 28 are 313 nm and 220 nm which both are not in the range or the group of wavelengths recited in claim 25. Further, it would have been obvious to one skilled in the art to utilize any kind of light sources whose wavelengths are in the range of deep ultraviolet for an exposure process from a reticle to a wafer using the lens system provided by Gibson to obtain a good resolution due to the different materials of the lens elements.

With regard to the features concerning the scattered light from the objects and the classify of the defects/features between the objects as recited in claims 34, 36, and 39, such features are clearly inherent from the system provided by Gibson without any specific limitations recited in the present claims. In particular, since the reticle comprises different areas and the different areas are illuminated to form images in a wafer; therefore, any scattered light from the reticle will be guide/imaged onto the wafer. The classification of the defects/features of the different areas of the reticle also recognized/observed by a user during the process of exposure the reticle to ultraviolet light.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to utilize the teaching provided by Gibson, i.e., the use of



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different materials for a cemented lens system in an exposure process for transferring patterns on a reticle to a wafer in a device operating with a deep ultraviolet illumination to obtain a good resolution of the image of the reticle on the wafer.

11. Claims 21-40, as best as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer (U.S. Patent No. 5,031,976) in view of Gibson (U.S. Patent No. 5,031,977).

Shafer discloses a catadioptric system having a focus lens group, a field lens group, and a focusing lens group for use in an optical device utilizing deep ultraviolet illumination. Shafer teaches the use of fused silica for the lens constituting the field lens to correct for the image aberrations. While Shafer does not disclose the use of different materials for the lens elements in his system; however, in column 4, the first paragraph, Shafer indeed discloses that it is known in the art to use an achromatic doublet of different materials for correction of the image aberrations, i.e., colors. Further, the use of a lens system made by different materials in an exposure device utilizing deep ultraviolet illumination is known in the art.

Gibson discloses an optical lens system for imaging light in the deep ultraviolet range in an exposure system for copying images/patterns of a reticle to a wafer. The optical lens system comprises two lens elements cemented together wherein the materials of the two lenses are of different dispersions. In other words, one of the lenses is made by fused silica and the other lens is made by lithium fluoride.

The lens system as described by Gibson is used in a photolithography system wherein the illuminating light has design wavelengths of 249.8 nm and 243.8 nm (see column 3) for illuminating a reticle which as understood comprises patterns whose material is different from that of the reticle.

With regard to the wavelengths of different values as recited in the present claims 25 and 28, and the separation between the two wavelengths as recited in claim 26, such features are not critical to the invention by the mutually exclusive of the values of the wavelengths claimed. For instance, while the wavelengths of the claim 25 are selected from a group consisting of 193 nm, 248 nm and 365 nm then the wavelengths of claim 28 are 313 nm and 220 nm which both are not in the range or the group of wavelengths recited in claim 25. Further, it would have been obvious to one skilled in the art to utilize any kind of light sources whose wavelengths are in the range of deep ultraviolet for an exposure process from a reticle to a wafer using the lens system provided by Gibson to obtain a good resolution due to the different materials of the lens elements.

With regard to the features concerning the scattered light from the objects and the classify of the defects/features between the objects as recited in claims 34, 36, and 39, such features are clearly inherent from the system provided by Gibson without any specific limitations recited in the present claims. In particular, since the reticle comprises different areas and the different areas are illuminated to form images in a wafer; therefore, any scattered light from the reticle will be guide/imaged onto the wafer. The classification of the defects/features of the

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different areas of the reticle also recognized/observed by a user during the process of exposure the reticle to ultraviolet light.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the catadioptric device provided by Shafer by utilizing the teaching provided by Gibson, i.e., the use of different materials for a cemented lens system in an exposure process for transferring patterns on a reticle to a wafer in a device operating with a deep ultraviolet illumination to obtain a good resolution of the image of the reticle on the wafer.

### ***Conclusion***

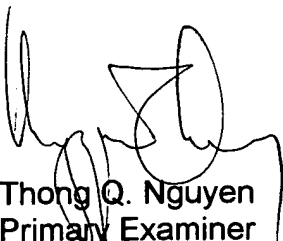
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thong Q. Nguyen whose telephone number is (703) 308-4814. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

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Thong Q. Nguyen  
Primary Examiner  
Art Unit 2872

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October 23, 2002